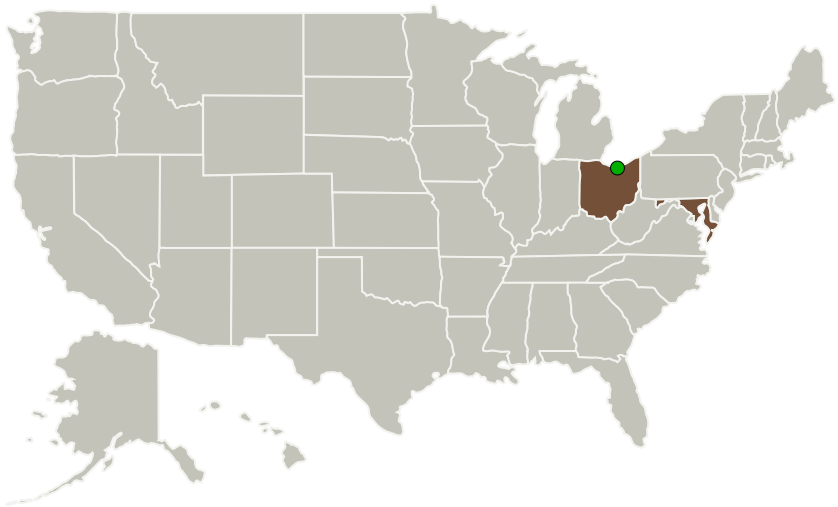
A Quantum Cascade Laser-Based CO Sensor for Fire Warning, Phase I

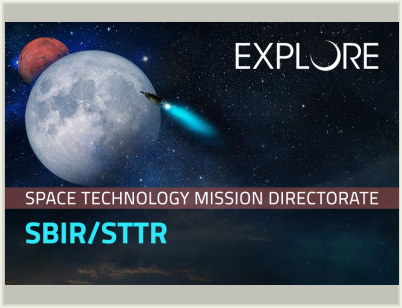
Completed Technology Project (2010 - 2010)

Project Introduction

Maxion Technologies and Physical Sciences Inc. (PSI) propose to jointly develop a compact, rugged, highly reliable, and autonomous sensor for in-situ monitoring of CO in spacecraft crew areas for fire warning. Our innovation is to combine a custom fabricated Quantum Cascade Laser (QCL) with PSI's proprietary single board electronics package that incorporates both a high sensitivity optical detection technique and all system control functions, to create a laser spectrometer for CO. The advent of QCLs enables the development of a very compact and highly sensitive monitor. This technical approach will result in a sensor that has the requisite dynamic range of 1 to 500 ppmv with a precision of 1 ppmv CO, in a physically robust and compact package. The Phase I program will demonstrate the feasibility of a breadboard sensor and create a detailed conceptual design for an advanced prototype. The TRL at the beginning of Phase I is level 2 and the TRL at the end of Phase I will be level 4. The Phase II program will fabricate a prototype that can be demonstrated at a relevant simulator. The TRL at the end of Phase II will be level 6. Successful completion of Phases I and II will result in a rigorously validated prototype sensor that can monitor ambient CO with high speed and precision. The sensor architecture can be easily modified to measure other species.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Maxion Technologies, Inc.	Lead Organization	Industry	JESSUP, Maryland
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Maryland	Ohio

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140084)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Maxion Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

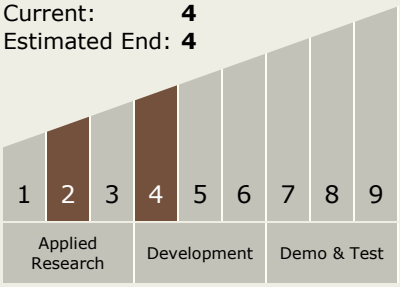
Carlos Torrez

Principal Investigator:

John F Bradshaw

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.2 Fire: Detection, Suppression, and Recovery

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System